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Metallurgical Project

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PLANS FOR MONITORING OF RADIATION FOR HEALTH PROTECTION AT THE CLINTON LABORATORIES*

by

Radiation Monitoring and Instrument Coordinating Committee
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Plans for Monitoring of Radiation for Health Protection at the Clinton Laboratories

The following is the final report of the Committee for monitoring radiation for health purposes at Clinton Laboratories. In some instances the number and location of instruments are those worked out by the committee with additional suggestions by Dr. Stone

The monitoring of radiations received by individuals. Every person entering the grounds of the Clinton Laboratories, is to be supplied at the gate with a pocket condenser type ionization chamber which must be worn throughout the entire period of his stay within the grounds and submitted at the Gate House when he is leaving. This will apply to visitors as well as regular personnel. By this means it is hoped that a complete record of the radiation received by every person will be made a matter of record.

In addition to the condenser ionization chambers, a film type meter is being investigated, which if found feasible can be used as a check against faulty instruments. Such film meters will be used only on permanent personnel and will be collected about once a week or at whatever interval is found feasible.

Plant monitoring instruments. Integrating recording meters will be put at critical points throughout the various buildings for a permanent record of the total exposures in these areas. In the extraction plant and we hope the pile building, there will be in addition intensity meters with a permanent record being kept of intensity at all times.

Atmospheric monitoring instruments. In addition to the recording integrating meters in the buildings, there will be recording integrating meters in the guard towers around the grounds and at various other locations outside of the Clinton Laboratories area and outside of the Site X area as a whole. In addition to these, surveys with survey instruments will be conducted by the Health Physics section under varying atmospheric conditions at various points both near to and far from the Clinton Laboratories. These surveys will be conducted with both direct reading survey instruments and Lauritsen electroscopes.

Water Monitoring. Water entering the cooling ponds must be monitored at the point of entrance by taking samples and measuring them with Geiger counters and Scaling circuits in the Chemistry building. In addition to this the water in the metal storage tanks should be sampled at intervals and water in the temporary holding tanks should be measured before discharge. It is hoped that a dam can be built across the creek down near its point of entrance into the river so that the water entering the river from the creek can be sampled at least once every 24 hours.

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The Health-Physics section is to work on integrating condenser chambers that can be used for constant recording of the ionizing radiation in the water.

Monitoring of the air entering the stack will be taken care of by V. Wilson and his group.

To accomplish the above the Committee has recommended:

1. Construction of an air conditioned room adjacent to the gate houses to be used for the reading and servicing of the pocket ionization chambers and for the film type radiation meters if they are developed.

2. The acquisition of the instruments listed below. They are listed first as to specifications, second as to distribution according to type of instrument, and third distribution according to location.

A. SPECIFICATIONS

Victoreen Pocket Condenser Ionization Chambers, to be obtained from the Victoreen Company. Scale 0 - 0.2 r, wall thickness about 2 mm. bakelite, end cap to contain a desiccating agent, chambers serially numbered. Quantity - 1200.

Victoreen Minometer chargers and readers. These are to be the standard type provided by the Victoreen Company with slight alterations suggested by Mr. Wollan connected with the zero point and the eliminating of the charge on the cases. The committee recommended the acquisition of 6. Dr. Stone felt that if the instruments listed next below could be obtained, 3 of these would be sufficient, but if the instruments listed below cannot be obtained 6 of these should be purchased.

Victoreen Minometers with stabilized power supplies so chambers can be interchanged from one to another, and with a projection type scale for easy reading. Quantity to be purchased when available is 3.

Lauritsen Pocket Electroscopes equipped with eye piece and scale, so that the accumulated dose can be read at any time without attachment to a second instrument. Quantity - 100 of these

have been ordered from Fred C. Hensen for the Metallurgical Laboratory and about 50 of them can be transferred to the Clinton Laboratories if they prove satisfactory. More can be ordered as the need is determined.

Survey Meters, portable, direct reading intensity type (Victoreen Company). 35 of these are to be purchased with cases having a door such that it can be opened exposing about one-half of the chamber surface. Case to contain the battery, tube unit and measuring meter together with the ionization chamber. Chambers are to be sensitive to gamma-rays only when the end of the case is closed, and beta- and gamma-rays when the end is open. They are to vary as to scale and chamber attachment as follows:

20 - scale 0 - 100 milliroentgens/hour (chamber fixed in case)

10 - scale - - 20 milliroentgens/hour (chamber fixed in case)

5 - scale 0 - 5 roentgens/hour. The sensitive chamber of these to be mounted on a probe pole made up of four 3 ft. joinable lengths with a 90° elbow joint for insertion between any two lengths, and 50 ft. of flexible cable with connector to reading unit through open door. The probe pole sections to have clips for carrying connecting cable along the probe and a carrying case for probe pole sections, chamber and connecting cables provided. The chambers are to be furnished with a detachable beta-ray shield of wood, bakelite or similar material.

Integrating Radiation Meters with proper attachment for recording meter. (Victoreen Integron type). The integrating radiation meter includes the ion chamber and motor unit assembly with desiccant provided in the ion chamber and extension cord 20 ft. in length extending to a table mounting case, housing an amplifier, indicating and timing unit assembly. Provision is to be made in the case for disposing of any extra extension cords. Case includes a device to charge the apparatus every 8 hours and a mechanism for an automatic recharge after each discharge to the full length of the scale. A 5 minute dead time is permissible at each charging point. Timing clocks should be synchronous motor drive and not adjustable from the operating face of the case. The indicator is to be calibrated to a scale of 0 - 200 milliroentgens, with the zero point to the right. All adjustments to be made through a concealed hole.

Victoreen is to provide a 600 ohm circuit, comprising a 590 ohm resistance and a 10 ohm resistor across which a Leeds & Northrup recorder could be connected. In addition a resistor suitable for use with an Esterline-Angus 0 - 1 milliampere recorder will also be provided. A connection is also to be provided for the attachment of an alarm mechanism. The Committee has recommended the purchase of 20.

Lauritsen Electroscope Survey Meters. These consist of an ordinary Lauritsen Electroscope mounted in a case with batteries for charging and with a flash light bulb for illumination. The chambers will have a thin aluminum window and the case will be provided with a hinged door which can be opened when it is desired to measure beta-radiation through this window. 25 of these have been ordered from Fred C. Hensen for the Metallurgical Laboratory. 15 of these will be taken to the Clinton Laboratories and more ordered when needs are determined.

Geiger Counters and Scaling Circuit. To be provided by V. Wilson and his group in the Extraction Building Control Room for measuring samples of water. The scaling circuit is to be supplied by the Operators through J. N. Wilson.

Radiation Rate Meters, D. C. Amplifier type. These are to be supplied by V. Wilson for use in the Extraction building and are to be largely for operational purposes, but can act as checks on the integrating meters.

Victoreen Condenser r-meters. The committee recommends two instruments with a set of chambers for each, consisting of the following: (2) 0.25 r, (1) 25 r, (2) 100 r, (1) 250 r.

Neutron Radiation Meters for health purposes: Water radiation meters for integrating the dose in water. These are to be developed by Wollan and Parker.

Stack Monitoring Instruments. These are being developed and are to be installed by V. Wilson and his group.

Water Rate Meters. Meters for measuring the flow of water are to be developed by the Engineering group for measuring the flow of all water from possible active sources into the creek, and if possible for measuring the flow from the creek into the river.

B. DISTRIBUTION OF METERS ACCORDING TO TYPE

Pocket Condenser Ionization Chambers (Victoreen)

On personnel entering Clinton Laboratories grounds	800
On guards patrolling Clinton Laboratories grounds, about	20
On guards patrolling entire X area, about	50
At various locations on and near grounds, about	50
Spares for repair, replacement, etc. (In instrument Reading and Repair Room	280
Total	1200

Minometers for Charging and Reading Pocket Chambers (Victoreen)

In Gate House reading and servicing room (New projection type units if possible)	3
In Health Building, Physics Room	2
In Clinton Laboratories rooms for Administration area near village	1
Total	6

Survey Meters, Portable, Direct Reading Intensity Type (Victoreen)

Scale 0 - 100 milliroentgens/hour (= .8 r/8 hours)

Separation Building	3
Pile Building	3
Chemistry Building	3
For Survey purposes	3
In Health Physics Room (Spares and Survey)	8
Total	20

Scale 0 - 20 milliroentgens/hour (= .16 r/8 hours)

Separation Building	2
Pile Building	2
Chemistry Building	2
Health Physics (for survey, spares, repair)	4
Total	10

Scale 0 - 5 roentgens/hour (= 40 r/8 hours)

Separation Building	1
Pile Building	1
Chemistry Building	1
Health Physics	2
Total	5

Recording Integrating Meters (Victoreen Integrons)

Separation Building	6
Pile Building	6
Atmospheric Monitoring	8
Total	20

Lauritsen Electroscope Survey Meters (Hensen)

Health Physics Group

Total.....15

Geiger Counters and Scaling Circuit

Extraction Building Control Room

Total.....1

Rate Meters, D. C. Amplifier Type (V. Wilson)

Separation Building

Total.....6

Neutron Radiation Meters for Health Purposes

Under construction by Wollan and Parker for Pile Building.

Film Type Radiation Meters

Gate House Meter Reading Room. (Under study by Wollan, Parker and duPont Film Division)

Victoreen Condenser r-meters

In Health-Physics Room for loan under supervision as needed

Total.....2

Water-Radiation Meters (when developed)

Metal Storage Tank
Holding Tanks, Cooling Ponds
Discharge Pipes to Creek
In Creek near River

Stack Monitoring Instruments

In Fan House

Water-flow Rate Meters

Creek as it leaves grounds
Creek as it enters River

D. DISTRIBUTION OF METERS ACCORDING TO LOCATION

Extraction Plant

On each panel (Fixed)
1 Victoreen Integrating meter with recorder.
1 D. C. Amplifier Rate meter.

Survey - movable to cells, etc.
3 - Direct reading Intensity survey meters, scale 0 - 100 mr/hour
2 - Direct reading Intensity survey meters, scale 0 - 20 mr/hour
1 - Direct reading Intensity survey meters, scale 0 - 5 r/hour
(This meter provided with extension rod for projecting ion chamber around corners, etc.)
2 - Geiger counters and 1 scaler in Control room for sampling meters.

Pile Building

On wall opposite each face of pile
1 each = 4 Victoreen Integrating meters with recorder

Above top of pile
1 - Victoreen Integrating meter with recorder.

On Operators Control platform
1 - Victoreen Integrating meter with recorder.

Survey purposes - available in building
3 - Direct reading Intensity survey meters, scale 0 - 100 mr/hour
2 - Direct reading Intensity survey meters, scale 0 - 20 mr/hour
1 - Direct reading Intensity survey meters, scale 0 - 5 r/hour
(This meter provided with extension arm.)

Fan Building- Stack Monitoring

Left to V. Wilson and group - but to have recording meters from which rate and integrated dose can be determined.

Chemistry Building

3 - Survey meters, scale 0 - 100 mr/hour (Victoreen)
2 - Survey meters, scale 0 - 20 mr/hour (Victoreen)
1 - Survey meters, scale 0 - 5 r/hour

Physics Building

No assigned instruments.

Health Building

The following instruments are for (1) survey and checking purposes by the Health-Physics group, (2) loan under supervision to other groups, (3) as spares to replace other similar instruments while being repaired.

1 - apparatus for measuring activities of thyroids
1 - apparatus for measuring intensity of exhaled gases
2 - Standard Victoreen condenser r-meters each with (2) 0.25 r, (1) 25 r, (2) 100 r, and (1) 250 r chambers.
11 - survey meters, scale 0 - 100 mr/hour (Victoreen)
4 - survey meters, scale 0 - 20 mr/hour (Victoreen)
2 - survey meters, scale 0 - 5 r/hour (Victoreen)
200 - Pocket condenser meters 0 - 0.2r (Victoreen)
50 - Lauritsen pocket electroscopes (Hensen)
15 - Lauritsen electroscope survey meters.

Atmospheric Monitoring

8 - Integrating dose meters with recorders (Victoreen Integron)
1 - on Guard Tower in North side Clinton Laboratories grounds
1 - on Guard Tower in East side Clinton Laboratories grounds
1 - on Guard Tower in South side Clinton Laboratories grounds
1 - at Site X village (Maybe Administration Bldg. across highway)
1 - in Clinton (town proper) probably Post Office
2 - one on Site of each of other two projects

At guard houses in Clinton Laboratories areas
Victoreen pocket chambers (to check integrating meter)

On guards around entire Site X area
Victoreen pocket chambers (To be read by Minometer in Administration area of entire Site X- Clinton Employment Rooms.)

At various inhabited areas near Clinton Laboratories
Pocket type condenser chambers.

Water Monitoring

Immersion instruments to be designed and built by Wollan and Parker. Until then water samples are to be measured in the Extraction Plant Measuring Room by the Operational staff - samples taken from -
Metal storage tank, holding tanks - cooling ponds - creek as it leaves area - creek near river.